‘Aha Huliko’a Workshop Series

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LONG-TERM GOAL

The goal of the workshop series is to review the state-of-the-art, to identify areas of ignorance, and to make recommendations for future research on a topic or topics relevant to the Office of Naval Research.

SCIENTIFIC OBJECTIVES

The participants of the 1997 workshop were tasked to assess the merits of Monte Carlo simulations in oceanography, especially in the fields of data assimilation, turbulent transport, population dynamics, and wave propagation through random media.
The participants of the 1999 workshop were tasked to assess the state of internal wave modeling in oceanography.

APPROACH

WORK COMPLETED

A four-day workshop on “Monte Carlo Simulations in Oceanography” was held from January 14 - 17, 1997, in Honolulu, Hawaii. The workshop brought together oceanographers, climatologists, physicists, statisticians and probabilists. The lectures of the participants are published in Muller and Henderson (1997). A summary of the workshop is given in Muller and Henyey (1997)
The 1999 workshop will be held on January 18 –22, 1999, titled “Internal Wave Modelling.”

RESULTS

Models in oceanography and elsewhere contain uncertainties that need to be understood and quantified in order to assess the skill of the model. Monte Carlo simulations become the method of choice when the high dimensionality or nonlinearity of the problem renders the more traditional moment-based methods either theoretically or computationally intractable. Monte Carlo simulation directly give the evolution of the probability density function from which the moments or any other desired statistics can be derived. When using Monte Carlo simulations, it is imperative to choose a random process that adequately models the underlying uncertainties. This requires insight and intuition of the modeler. Processes other than Gaussian white noise might be called for. Computational aspects can also be

nontrivial and are often daunting. However, when properly applied, Monte Carlo simulations offer an economic, and often the only, way to make headway on a problem, as shown by the many examples discussed at the workshop.

IMPACT/APPLICATION

TRANSITIONS

RELATED PROJECTS

REFERENCES

Müller, P. and D. Henderson, 1997: “Monte Carlo Simulations in Oceanography.” Proceedings, 'Aha Huliko'a Hawaiian Winter Workshop, School of Ocean and Earth Science and Technology, Special Publication.

Müller, P. and F. Henyey, 1997: Workshop Participants assess Monte Carlo simulations in oceanography. EOS, Transactions, American Geophysical Union., (submitted)